EDENext :
From eco-epidemiology to public health

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VBorNet Annual Meeting

Riga, 8 May 2012

Outline

- EDEN & EDENext

- Bio-ecology & epidemiology results for public health

- Public health research in EDENext

EDEN & EDENext

The EDEN project

- EDEN Emerging vector-borne diseases in a changing European environment
  - FP6, 11.5 M€
  - 49 partners, 24 countries
  - 2005-2010

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Biology and control of vector-borne infections in Europe
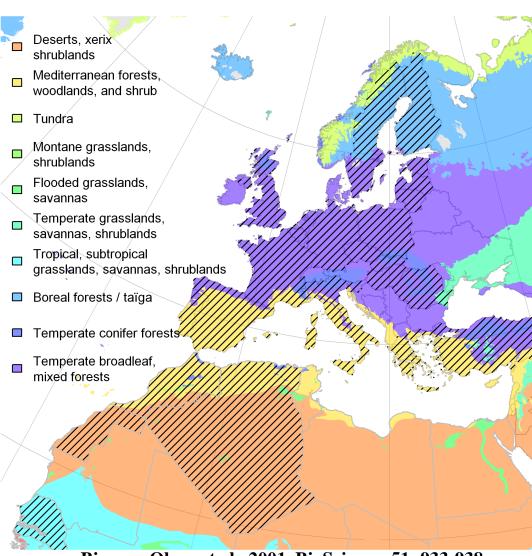
EDEN research questions

- What are the drivers explaining the upsurge of an emerging vector-borne disease?

- What are the main biomes exposed at high risk of emerging VBD?

Legend:
- Deserts, xerix shrublands
- Mediterranean forests, woodlands, and shrub
- Tundra
- Montane grasslands, shrublands
- Flooded grasslands, savannas
- Temperate grasslands, savannas, shrublands
- Tropical, subtropical grasslands, savannas, shrublands
- Boreal forests / taïga
- Temperate conifer forests
- Temperate broadleaf, mixed forests

Biomes: Olson et al., 2001. BioScience, 51: 933-938.

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SEVENTH FRAMEWORK PROGRAMME

The EDENext project

- Biology and control of vector-borne infections in Europe
  - FP7, 12 M€
  - 46 partners, 22 countries
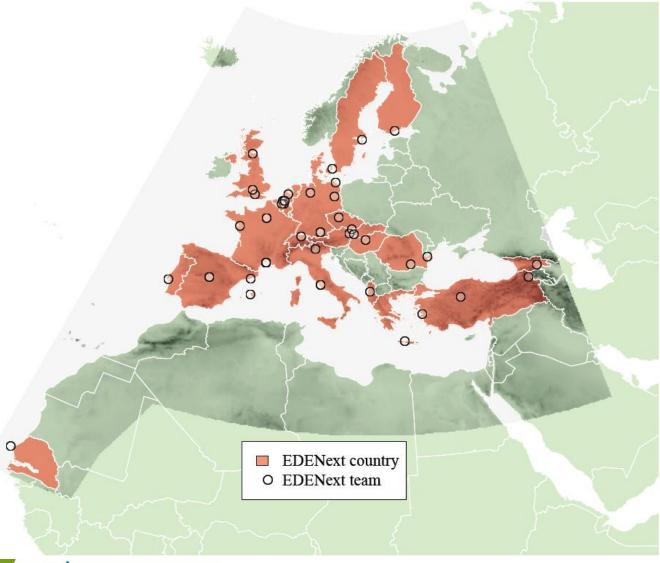 - Jan 2011 → Dec 2014

EDENext goals

- Explain (and find drivers) the <u>bio-ecological processes</u> to develop methods and tools for prevention, surveillance and control of human and animal VBD's
  - Introduction
  - Emergence
  - Spread

- Assess the <u>control strategies</u> to break the epidemiological cycles of VBDs

- Develop <u>public-health tools and strategies</u> based on <u>actual risk perception</u> by target populations

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EDENext partners
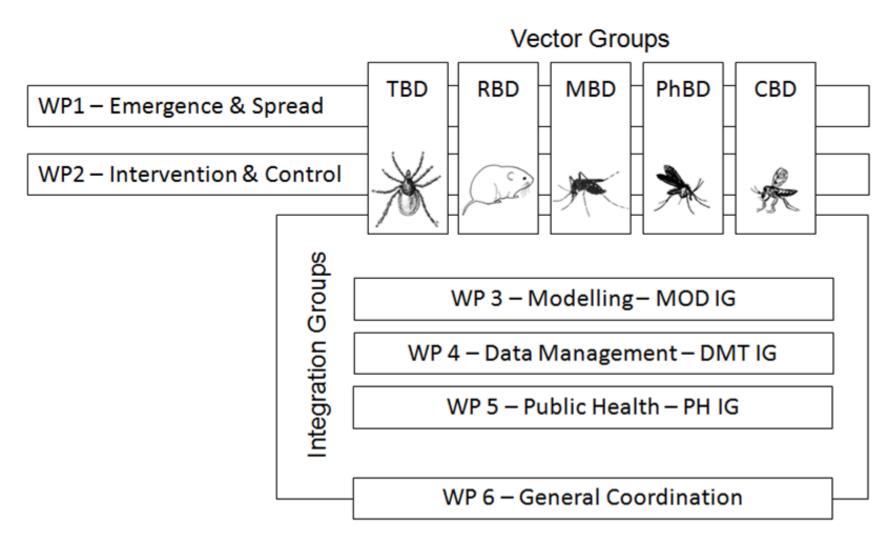

EDENext country
EDENext team

EDENext: general structure

EDEN & EDENext

- > 10 yrs of research on the bio-ecology of vectors, and epidemiology of VBD's in Europe, the Middle East (Turkey), and Africa (northern Africa, Senegal)

- Large European research network with exceptional environmental, as well as human & veterinary public-health, data sets

- Large effort in capacity building / PhD network

➔ **we must take advantage of this to implement excellent public health research and get significant results**
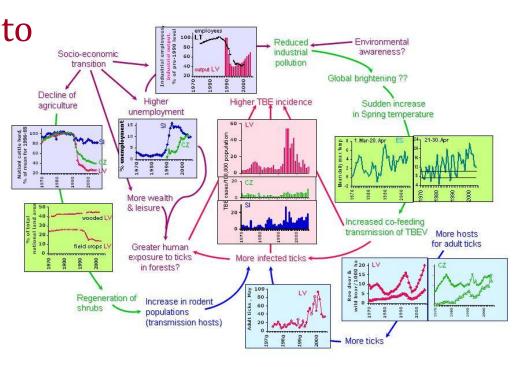
Bio-ecology and epidemiology

Where are we?

- More and more results to increase bio-ecological and epidemiological knowledge of complex disease systems
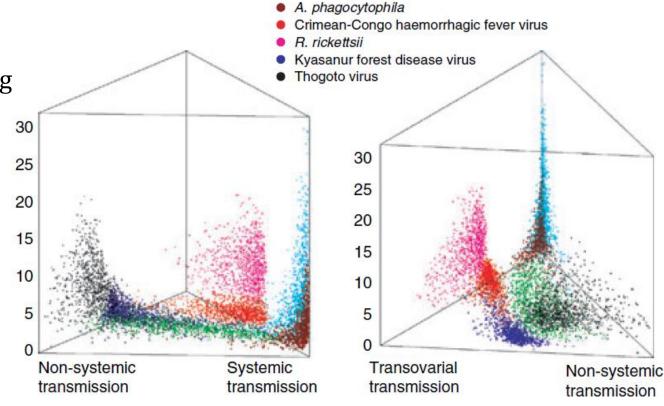
Šumilo et al. 2007. PLoS ONE: e500.

Where are we?

- More and more models to study the properties of these epidemiological systems

Two perspectives on the 3-D ternary plot, showing the contributions to R_0 from the 3 transmission routes for some TBD's

Vertical axis : R_0

Matser et al., 2009. Ecol. Lett., 12: 1-8.

- B. burgdorferi
- Tick-borne encephalitis virus
- A. phagocytophila
- Crimean-Congo haemorrhagic fever virus
- R. rickettsii
- Kyasanur forest disease virus
- Thogoto virus

Where are we?

- Models can be used to assess the effect of intervention scenarios (or other changes)

Simulation of the effects of acaricide application on an *Ixodes ricinus* population in Dorset, UK.
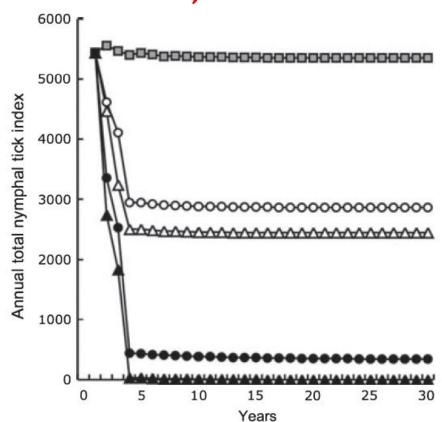
Control (□);

Scenario 1 (△), acaricide applied to 10% (open symbol) or 50% (filled symbol) of the existing large host community (e.g., sheep)

Scenario 2 (○), acaricide applied to 10% (open symbol) or 50% (filled symbol) of newly added large hosts

Dobson & Randolph 2011. J. Appl. Ecol., 48: 1029-37

Take-home messages

- <u>Disease</u> emergence is a <u>complex phenomenon</u> that cannot be reduced to a single cause

- <u>Socio-economic changes and human behavior</u> are sometimes more important than climate or other environmental changes to explain <u>disease</u> emergence

- <u>Long-term field work and good public health data</u> are essential to elucidate the important driving forces

Public health in EDENext

- **Special focus on CCHFV and Hantaviruses**

  – Risk perception studies in high-risk countries & areas

  – Design adequate tools & methods to prevent virus transmission to humans

  – Provide PH agencies with such tools & methods

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Riga, 8 May 2012

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Public health approach

- Focus on **primary prevention** (i.e., to prevent the occurrence of a disease) in human or animal <u>populations</u> rather than on individuals

- ➔ **Assessment** and **communication** of health risks plays a central role in veterinary and human PH research

Public health approach

Example: public risk perception and risk communication for Hantavirus infection in Germany

Work by S. Schüle / K. Dressel, SINE-Institute Munich (Germany)
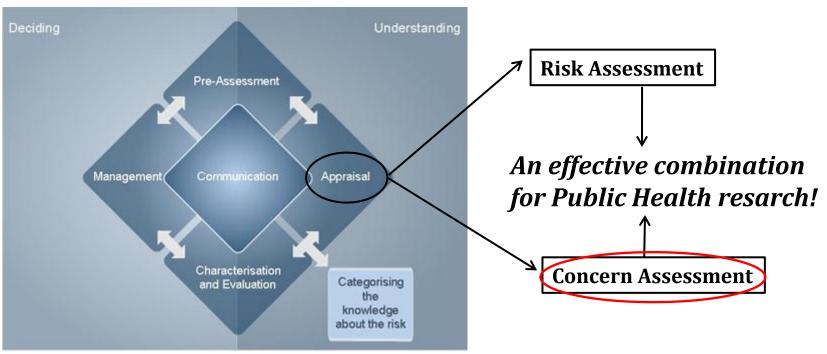

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Framework and methods

The IRGC Risk Governance Framework to assess PH risks

International Risk Governance Council, 2008

- Pre-assessment: addressing and framing the public-health risk
- **Risk appraisal:** combination of **risk** assessment, and **concern assessment**
- Characterisation and evaluation: is the risk tolerable and /or acceptable?
- Management: to take actions
- Communication: to establish an interactive two-way communication process

Public health: concern assessment

Top-down approaches in **public risk communication**

Methods:

Risk communication strategies:

- PH authorities ← Intra -and
- Stakeholders ← Inter-communication

Expert interviews & Review of literature

improve

? ? **Risk awareness**

- Risk associations and concerns
- Risk knowledge
- Risk behaviour
- Information behaviour
- Assessment of received information

Focus groups in endemic areas

Bottom-up perspectives of **public risk perception**

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Preliminary results

Risk Assessment

Quantitative approach

Concern Assessment

Qualitative or semi-quantitative approach

What are your first associations regarding the Hantavirus or mice transmitted diseases?

Risk factor

Seeing or trapping rodents[a,b]

Using hay in sleeping areas[b]
 (during military manoeuvres)
Wood cutting[a]
Living close to forest (<100 m)[a]
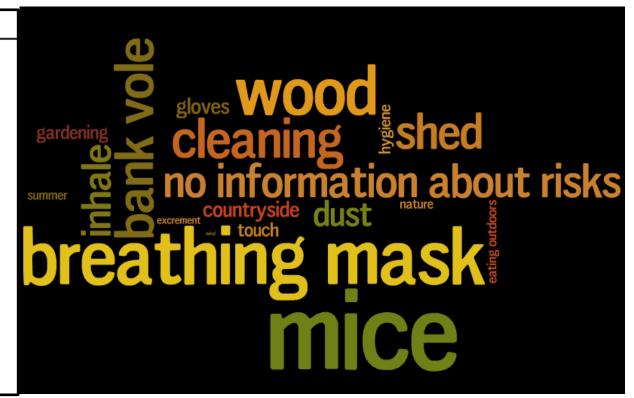Taking walks in a forest (number of days)[a]
Exposure in a forest (spending >16 h in forest,
 fetching, picking up, carrying or working with
 wood or exposed to dust or earth in a forest)[a]
Entering a building where there may have been
 rodents (spent more than 2 h there, cleaning,
 raising dust or vigorous physical effort)[a]
Being a construction worker[a]
Strenuous physical effort[a]
Tobacco use (cigarettes per day)[a]

Piechotowski et al. 2008: Risk factors for human Puumala virus infection in Western Europe determined by case-controls studies.

infections in Europe

Challenge

- A joint effort is needed to fully integrate the public-health approach in the EDENext strategy, i.e. to understand the processes to develop quantitative, predictive models of VBD emergence & spread

  - **Quantitative ecologists, epidemiologists and modellers:** how to account for the qualitative or semi-quantitative results provided by the public-health researchers?

  - **Public-health researchers:** a lot of work is needed to understand and take advantage of bio-ecological and epidemiological knowledge

European Society for Vector Ecology   8 - 11th October 2012 • Le Corum, Montpellier, France

18th Conference
E-sove 2012

General information | Scientific programme | Social programme

Thank you for your attention and see you soon!

http://www.edenext.eu/
http://www.esove2012.eu/